

Indian speech must be rather sought in the hills and in the peninsula ; in the plains and populous districts of the north the evidences of their existence are necessarily smothered by the predominance of the refined and durable languages of the court, of religion, and of the educated classes. A writer in the *Foreign Quarterly* has lately been bold enough to revive the theory of Sanskrit being merely a derivative from the Greek through the intervention of the Zend, and subsequent to the Macedonian invasion ! The Agathocles' coin ought to answer all such speculations. The *Pill* of that day along with its appropriate symbols is proved to have held the same precise derivative relation to the Sanskrit as it does now—for the records on which we argue are not modern, but of that very period. All we still want is to find some graven Brahmanical record of the same period to shew the character then in use for writing Sanskrit ; and to add ocular demonstration to the proofs afforded by the profound researches of philologists as to the genuine antiquity of the venerable depository of the Vedas.—ED.

VI.—*Geometric Tortoises*, “*Testudo Geometrica.*” By Lieut. T. HUTTON,  
37th Native Infantry.

*Africa* being as yet the only recorded habitat of the Geometric Tortoise, I have thought it advisable to make known the existence of these animals in the hilly tracts of *Meywar*, and the adjoining districts, where they are found in the high grassy jaunglas, skirting the base of the hills, and are by no means of rare occurrence.

I usually employed a few Bheels to seek for them, who thought themselves well paid with a pint of brandy for a pair of Tortoises. Although not uncommon, they are nevertheless not easily procured, owing to their color and appearance being so blended with the rocky nature of the ground, as to render it difficult to distinguish them from surrounding objects ; added to which, they remain in concealment, beneath shrubs or tufts of grass during the heat of the day.

The Bheels, however, are expert in tracking them through loose soils, and having discovered a foot print in the sand of a nullah, or the dust of the grass plains, they generally succeed in capturing the animal, by patiently following the traces it has left.

It is during the rainy season that they are in the greatest activity and wander about all day, feeding and coupling. At the approach of the cold weather they select a sheltered spot and conceal themselves by thrusting their shell into some thick tuft of grass and bushes, the better to protect them from the cold, remaining thus in a sort of

lethargic inactivity (for they are not torpid), until the hot season, at which time they only remain concealed during the heat of the day, coming out about sunset to feed.

As I have several of these animals alive, I shall give an outline of their general habits in a state of confinement. I have at different times procured seven of these creatures, three of which are females, and are easily distinguished by their larger size. They were all turned loose into a large enclosure, and well supplied with water, and grass, both dried and green, and a heap of bushes and grass to hide themselves in.

Throughout the hot season, they remained all day in concealment, coming out a little before sunset, to feed on the grass, lucern, or cabbage leaves, which were thrown to them. As night approached they did not again retire, but, as if enjoying the coolness of the air, remained stationary until morning, when they withdrew to their retreats before the sun rose. They did not wander about during the night, but remained as if asleep.

At this season they were fond of plunging into water where they would often remain for half an hour at a time: this, too, generally had the effect of making them void their excrement, which appeared to be hard oblong masses of ill digested vegetable fibres, and along with it a small quantity of a white chalky substance.

They drank a great quantity of water, which they took by thrusting in the head and swallowing it by draughts. As the rainy season set in, they became more lively and were to be seen throughout the day wandering about in the rain, feeding freely and resting at intervals, and frequently performing the rites of love. Often indeed two or three males succeeded each other with little intermission, without appearing to inconvenience the female who lay quite still cropping the grass within her reach. The male mounts on the back of the female like other quadrupeds, placing his fore legs on the top of the carapace while his hind legs rest on the ground. They remain engaged from ten minutes to a quarter of an hour, the male uttering, at intervals a groaning sound. They are not however, attached after the operation, as is said to be the case, but the desire of the male being appeased, he retires to rest and feed. During the whole period of the rains the females continued to admit the males freely, *i. e.* from the latter end of June until the middle of October, being nearly four months, when they became less familiar and drew off from each other.

On the 11th November 1835, one of the females commenced sinking a pit to receive her eggs, which she performed in the following manner. Having selected a retired spot at the root of a tuft of

coarse tall grass, she began to moisten the earth with water which she produced from the anus, and then with the strong horny toes of her hind feet, proceeded to scrape away the mud she had made. She used her hind feet alternately, and as she proceeded the water continued to be supplied drop by drop, so as to render the earth a thick muddy consistency and easy to be scraped out of the pit she was sinking.

In about two hours she had succeeded in making a hole six inches in depth and four inches in diameter. In this she immediately deposited her eggs, four in number, filling up the hole again with the mud she had previously scraped out, and then treading it well in and stamping on it with her hind feet alternately, until it was filled to the surface, when she beat it down with the whole weight of her body, raising herself behind as high as she could stretch her legs and then suddenly withdrawing them, allowing herself to drop heavily on the earth, by which means it was speedily beaten flat, and so smooth and natural did it appear that had I not detected her in the performance of her task I should certainly never have noticed the spot where her eggs were deposited. She did not immediately leave the place after finishing her work, but remained inactive, as if recovering from her fatigues.

In about four hours she had dug the hole, deposited her eggs, replaced the earth, and retired to feed.

The length of time required to bring the eggs to maturity cannot be ascertained however, as the males continued to have free intercourse with her during the whole period of the rains, which as I have already stated, was from the latter end of June, to the middle of October; therefore she may have conceived any time during that period.

The female considerably exceeds the male in size and can moreover be distinguished by the flatness of the under shell, whereas the male has that part very concave, and indeed without this formation he would be unable to couple with the female from the convex form of her carapace.

As they are constituted however, the concavity of his under shell, corresponds to the convexity of the upper shell or carapace of the female. The flattened form of the plastron of the female, may possibly be for the purpose of giving greater internal space for the ova.

As the cold season approached they became more sluggish, seldom leaving their retreats, and at the beginning of December 1833, they

remained altogether motionless, refusing to feed. They made no attempt to burrow in the ground, as the Greek Tortoise (*Testudo Græca*) is said to do, but thrust themselves in among the coarse grass which was heaped up in a corner of their enclosure. Until the 9th February 1834 they remained in a state of lazy, listless repose, having never stirred from the spot they had chosen full two months before. They were not however in a state of torpidity, but merely lying inactive as if they thought it too much trouble to move. When taken up they partially put forth the head to ascertain the cause of their being disturbed, but even if placed full in the sun's rays and left so all day, they never made the slightest attempt to move from the spot; as if they felt instinctively that the season in which their services were intended to be of use in the general economy of nature had not yet arrived.

The 9th, 10th and 11th days of February being cloudy with a few showers of rain, the Tortoises came forth and took some lucern, and drank plentifully of water. They did not continue to come out, but relapsed into their former repose, nor did they venture forth again in the evening until the hot season had commenced, or about the middle of April. The winter of 1834 proved much milder than that of the preceding year, and the Tortoises in consequence continued to come forth for their supply of food,—but instead of doing so in the evening as in the hot weather, they chose the middle of the day, remaining out for two or three hours basking in the sun, and retiring again to concealment in the afternoon. Sometimes the males did not come forth for a day or two, but the females were to be seen every day placing themselves close to the white walls of their enclosure, as if conscious that the rays of the sun would be thrown from it upon them.

The marking of the shells is the same in both sexes, and they are only to be distinguished by the difference in size and structure already mentioned, and in the unequal length of tail, that of the male being about twice the length of the female, the latter indeed possessing almost none.

In different individuals the yellow rays vary much in breadth, some having them broad, others narrow.

Both have the same number of scutella on the carapace which consists of thirteen pieces on the disc and twenty-three marginal, while the plastron or under shell contains fourteen pieces.

The length of shell in the female is 10 inches, that of the male from 8 to  $8\frac{1}{2}$  inches; if measured longitudinally over the carapace the length of the female is 13 inches and the male from  $11\frac{1}{2}$  to 12 inches. The scutella are black with yellow rays diverging from a yellow square

in the centre of each; each scutellum is also deeply striated or groved concentrically, and has a squarish form at the base.

The fore legs are well protected with strong nails or horny tubercles studded all over them, and the feet are all armed with solid nails, 5 on the fore feet and 4 on those behind. The skin is greyish black and the studs yellowish.

In July 1834, one female weighed  $5\frac{1}{2}$  lbs.

—— ditto ditto, . . . . .  $5\frac{1}{2}$  lbs.

Old male, . . . . . 3 lbs.

A male, . . . . .  $2\frac{1}{2}$  lbs.

—— . . . . .  $2\frac{1}{2}$  lbs.

—— . . . . . 2 lbs,

} a slight difference in  
size in the males.

The sexual organs of both are situated in the anus, the male having the power of exerting his, which is of large size.

The eggs of the Geometric Tortoise are pure white, of an oblong oval form, the ends being of equal size, and not smaller at one extremity as in the eggs of birds.

The shell is thin, and one inch and 8 lines in length and 4 inches in lateral girth. Those deposited in the earth as above mentioned were allowed to remain in the hope of seeing them hatch, but in the warmth of April 1835 somebody or something stole them and disappointed me.

As they increase in age, they lose the beautiful radiated appearance of the shell, and indeed it frequently peels off in scales even when they are in their prime.

I have an old male which has lost the yellow rays or rather which has lost the whole of the outer coating of the shell and is now of a dirty yellowish colour, the carapace being cracked and divided so irregularly, as to render it somewhat difficult to recognise the true divisions of the scutella. One of the females has also lost the outer coating of one or two scales, while in other respects she is quite perfect.

These animals when handled, will generally either from fear or as a means of defence, squirt out a quantity of water in a pretty strong stream from the anus.

I have read that the combats of the males may be heard at some distance, from the noise they produce in butting against each other. This was never the case with the Geometric Tortoises, although mine had frequent fights,—but these instead of butting, consisted merely in trials of strength, one male confronting another, with the head and fore-legs drawn into the shell, and the hind feet planted firmly on the ground, and in this manner shoving against each other until one or

both became fatigued. This was done chiefly when they wanted to pass each other in any narrow space, and sometimes if the one could succeed in placing his shell a little beneath the other, he tilted him over on his back, from whence he had great difficulty in recovering himself, and I have frequently found them sprawling thus, making desperate efforts with head and feet, to throw themselves back to their natural position, which they were unable to effect unless the ground chanced to be very uneven, so as to assist them.

In this kind of warfare the females also frequently indulged, and from their superior size and strength generally accomplished their wishes.

In farther illustration of the acknowledged strength of the shell in this tribe, I may mention that a party of officers on a shooting excursion, perceived some creature crawling among the high jangal grass, and not seeing distinctly what it was, fired a ball at a venture, which took effect on the front of the carapace, merely making a dent by chipping off the outer coating and causing no farther injury. This was the female which produced the eggs already mentioned.

I have an old work on Natural History, but by whom written I cannot ascertain, as the title pages are torn out, in which it is stated, on the subject of Land Tortoises, "that even the act of procreation, which among the animals is performed in a very few minutes, is with them the business of days. About a month after their enlargement from a torpid state, they prepare to transmit their posterity; and both continue joined for near a month, together."

Whether this be really the case with some species of Land Tortoise or not, I cannot presume to say, but as regards the Geometric Tortoise it is decidedly erroneous, these animals passing about a quarter of an hour in conjunction, when, as I have stated, the male having appeased his desire, dismounts and retires. They return to the females however, several times during the course of the day, and continued to do so throughout the rainy season. Although they mount several times during the day, the female does not admit them each time.

In No. 29 of LONDON'S Magazine of Natural History, at page 652, there occurs the following passage, "WHITE mentions it as reported of the Land Tortoise, that it is occupied one month in completing one *fête d'amour*; and this leads me to mention that I was more than once informed in Jamaica that the male and female turtle remain coupled during the period of nine days\*."

\* W. SELLS, Surgeon M. R. C. S., Kingston, Surrey.

Now as I have already shown that this habit does not hold good with *all* the species, I venture to ask, to what species of Land Tortoise do the foregoing quotations apply, and on whose authority is the assertion?

With regard to the turtles it is likely enough to be the case, and I believe the fact is well authenticated, not only with regard to their remaining coupled several days, but also that the male embraces the female with such strength, that she cannot shake him off. The old work above mentioned, says, the sea turtles, "couple in March and remain united till May." !!

In the water it would matter little, as they would not lose the power of locomotion,—but with the land tribe it is widely different, as the male when mounted, is at the full stretch of his hind legs, and could not walk with the female, for even if she move ever so little during the time of connection, he has great difficulty in maintaining his position, and is often fairly rolled over on his back. As to their lying still for a month with a fine green vegetation springing up all round them after having fasted for some months,—it is I think rather unquestionable. TANTALUS himself was not in a worse predicament !!

There is still another character assigned to the land tribe which in the present species does not hold good; viz. in STARK'S Elements of Natural History, it is stated that the females are to be distinguished from the males by their under shell or plastron being *convex*, while in the latter it is *concave*.

In the Geometric Tortoise the plastron of the female is *flat*,—that of the male *concave*.

Were the plastron convex, the animal could not rest quietly on a plane surface, but would pitch, "fore and aft," like a ship in a heavy sea, or at all events she would be obliged to rest with one end of the shell tilted into the air.

I may perhaps be censured for laying so much stress on such trifling errors, but as it is alone by true descriptions of the habits, manners, and construction of created beings, that we can ever hope in some measure to comprehend their uses, and the designs and purpose of our Creator in forming them;—I hold the man to be inexcusable who would perpetrate an error however trifling it may seem to be; for if the description is erroneous, it is consequently untrue, and the great object of scientific research is thereby defeated.

Now, although these (to me) seeming errors, may not be such, as regards *some species*, yet taking them in a general view, they are so, and consequently need correction.

The convexity of the plastron, may be a specific, but it cannot be made a generic character.

Soon after my arrival at Simla in March last, the old male died from cold\* ; the others lived through the rains well enough, but were not so lively as in the plains, moving about less frequently. One of the females even produced four eggs, but made no hole to receive them as in the former case, shewing plainly that the change of climate was at work upon them ; these eggs I placed under a hen, but in a few days they had disappeared as in the former instance, and whether stolen by my servants or by some small animal I could not discover.

The winter has proved too cold for the remaining tortoises which are dying fast, and of my seven pets I have only three alive, and I fear I shall be unable to save them.

VI.—*Barometrical Elevations taken on a journey from Katmandhu to Gosainsthán, a place of pilgrimage in the mountains of Nipál, by CHHEDI' Lohar, a smith in the employ of Captain ROBINSON, late commanding the Escort of the Resident in Nipál.*

The following table was placed in our hands by Captain ROBINSON, before his departure to Europe. It is curious as shewing to what good purposes the natural intelligence of uneducated servants, especially those of the mechanical classes, may be applied in judicious hands. CHHEDI' had acquired skill in the manufacture of guns, gunlocks, and any articles after European models ; he had learnt to boil barometers, and note daily observations for his master's meteorological journal before he was sent out on the experimental expedition in which he has acquitted himself so well. This journal comprehends times distances, statistical information, indications of the ब्रामीटर (*brámítar*) and मामीटर (*mámítar*), barometer and thermometer, the aspect of the sky, धुपवदरी पानी (*dhup-badarí-pání*) sun-clouds-rain, as he terms it ; and such other items of information as he thought worthy of notice. As a specimen of the mode in which his memoranda are booked, we quote the commencement of the journal, making use of Roman characters for want of the common *Kaithí* type.

\* The Bheels clean the shells of these animals from all flesh and the bones of the neck and legs, and stopping up one end with wood, use them as boxes to keep tobacco in !